Relationship between Inflation and Economic Growth: Determining the Threshold Level of Inflation in Bangladesh

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Outline

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- Objectives
- Historical Trends
- Methodology
- Empirical Results
- Concluding Remarks and Policy Implications
Introduction

- It is widely discussed and debatable issue in both theoretical and empirical findings.
  - Positive relationship between inflation and economic growth
  - Negative relationship between inflation and economic growth
  - Positive when inflation is low but negative for high inflation

- Inflation may affect investment which can affect growth
  - Higher inflation has a negative impact on private investment in manufacturing.

- That is why, optimal growth can be achieved by controlling inflation and side by side raising opportunities and facilities for private investment.
Barro (1990)  
Fischer (1993)  
Bruno and Easterly (1996)  
Sarel (1996)  
Ghosh and Phillips (1998)  
Khan and Senhadji (2001)  
Mallik and Chowdhury (2001)  
Ahmed and Mortaza (2005)  
Hayat (2012)  
Younus (2012)
Objectives

- To examine the inflation-growth nexus empirically in Bangladesh using annual data for the period FY1977–FY2015.

- To find out the threshold level of inflation rate for Bangladesh economy.

- To cushion efficient and effective policy recommendations for future.
Historical Trends of Inflation and Economic Growth in Bangladesh

Chart-1: Historical data: Inflation-GDP Growth

In percent
## GDP Growth-Inflation Relationship

<table>
<thead>
<tr>
<th>Level</th>
<th>Observations</th>
<th>Inflation Range (%)</th>
<th>Average GDP Growth %</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st Level</td>
<td>4</td>
<td>upto 3.00</td>
<td>4.40</td>
</tr>
<tr>
<td>2nd Level</td>
<td>6</td>
<td>3.01-5.00</td>
<td>5.25</td>
</tr>
<tr>
<td>3rd Level</td>
<td>5</td>
<td>5.01-7.00</td>
<td>5.74</td>
</tr>
<tr>
<td>4th Level</td>
<td>11</td>
<td>7.01-9.00</td>
<td>5.13</td>
</tr>
<tr>
<td>5th Level</td>
<td>13</td>
<td>above 9.00</td>
<td>4.37</td>
</tr>
</tbody>
</table>
GDP growth and inflation
(scatter diagram with polynomial (degree-2)
Methodology and Model Specification

1. Simple Model:
   \[ y_t = \alpha + \beta_1 \pi_t + u_t \]
   Prior expectation: \( \beta_1 > 0 \) or \( \beta_1 < 0 \), where \( y_t \) = real GDP growth, \( \pi_t \) = inflation rate.

2. Threshold Model:
   A. Sarel (2005) Method
   \[ y_t = \alpha + \beta_1 \pi_t + \beta_2 D_i (\pi_t - \pi^*) + u_t \] \[ (1) \]
   where, \( D_i \) = Dummy for a threshold level of inflation. \( \pi^* \) = A level of threshold inflation.
   \( D_i = 1 \), if \( \pi_t > \pi^* \) and 0 otherwise.
   ❖ Prior expectation: \( \beta_1 > 0 \) and \( \beta_2 < 0 \)
   ❖ Determination of a threshold inflation: \( (\beta_1 + \beta_2) < 0 \) and statistically significant.
   ❖ Iterative process assuming structural break: \( \pi^* = 4 \) to \( 7 \% \)
   ❖ Detection of appropriate threshold: The highest \( R^2 \) or lowest residual sum of squares (RSS)

B. Quadratic Model
   \[ y_t = \alpha + \beta_1 \pi_t + \beta_2 \pi_t^2 + u_t \] \[ (1) \]
   Prior expectation: \( \beta_1 > 0 \) and \( \beta_2 < 0 \)
1. Simple Model:

$$y_t = 6.12^* - 0.16^{**} \pi_t + u_t$$

(11.50) (-2.54)

Adj R² 0.20   F-statistic 6.47

(* and ** denotes coefficients are significant at 1% and 5% levels respectively).

Diagnostic Tests

- Diagnostic tests for simple model are satisfied.
Empirical Results

1. Threshold Model:

A. Sarel Method

\[ y_t = 3.54^* + 0.42^{**} \pi_t - 0.81^*(\pi_t-\pi^*) \]

(11.50) (-2.54) (-3.88)

Adj R² 0.35    F statistic 11.21

where threshold level of inflation (\( \pi^* \)) = 6.25%  

(* and ** denotes coefficients are significant at 1% and 5% levels respectively).

Diagnostic Tests

- Diagnostic tests for Sarel model are satisfied.
Empirical Results: Threshold Detection

The value of $\pi^*$ versus the residual sum of squares
Empirical Results: Threshold Model

B. Quadratic Model

\[ y_t = 3.76^* + 0.50^* \pi_t - 0.04^* \pi_t^2 \]

(4.91) (2.81) (-3.86)  
Adj R^2 0.37  F-statistic 11.93

(* and ** denotes coefficients are significant at 1% and 5% levels respectively).

Diagnostic Tests

- Diagnostic tests for quadratic model are satisfied.

The conditions for maximization for quadratic equation are satisfied.

1\textsuperscript{st} order condition : \[ \frac{dy}{d\pi} = 0.5 - 0.08\pi = 0 \]

2\textsuperscript{nd} order condition : \[ \frac{d^2y}{d\pi^2} = -0.08, \text{ which is } < 0 \]

Optimal rate of inflation : \[ \pi^* = \frac{0.50}{0.08} = 6.25 \]
Empirical Findings

- Non linear relationship between GDP growth and inflation: positive when inflation is low but negative for high inflation.

- The estimated threshold level of inflation is at 6.25 percent.
Concluding Remarks and Policy Recommendations

- Sustained growth needs macroeconomic stability with sufficient investment keeping inflation at low level.

- Controlling price level below the threshold level through Monetary policy.

- To tame inflation within growth-enhancing ranges and policy tightening through complementary mix of monetary and fiscal policies.

- Keeping inflation at a tolerable level to achieve the optimum economic growth.

- Rational target of inflation must be set.
Thank you all